

Remarks

Claims 1-10 are pending in the application. Claims 2 and 7 have been amended. In the Office Action mailed September 25, 2006, claims 2 and 7 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The claims were amended to delete the term “adjusted.” The claims as currently amended satisfy the requirements of 35 U.S.C. §112, second paragraph.

In the Office Action, claims 6-10 were rejected under 35 U.S.C. §102(b) as being anticipated by Murphy et al. (US 4,873,378) and Murphy et al. (US 4,873,379). Applicants respectfully traverse this rejection based on the claims as currently amended.

Claim 6 of the current application claims a reactive heavy components stream having a viscosity of less than about 100 mm²/s at 40°C, said stream formed by forming an aqueous solution of 3-hydroxy propanal, removing any catalyst used from the solution, adding to the solution a hydroxide selected from the group consisting of ammonium hydroxide, alkali metal hydroxides, other than sodium hydroxide, and alkaline earth metal hydroxides to neutralize any acid therein such that the pH is at least about 5, subjecting the neutralized aqueous solution to hydrogenation to produce a crude 1,3-propane diol mixture, and distilling said crude mixture to produce 1,3-propane diol, water, and the reactive heavy components stream.

The ‘378 patent describes a one-step process for manufacturing 1,3-glycols comprising reacting an epoxide with synthesis gas in the presence of rhodium and a phosphine. The ‘378 patent discloses that “a salt of an alkali metal cation and a solubilizing anion is also present in the reaction mixture.” (col. 3, lines 49-51). The ‘379 patent describes a process similar to that of the ‘378 patent except the phosphine is not present in the process. The ‘379 patent discloses that “various epoxides may require different reaction conditions, to achieve optimum results in terms of product yield and selectivity, as well as different specific rhodium and alkali metal ion, components in the reaction medium.

The ‘378 and ‘379 patents do not anticipate the current application because neither discloses adding to an aqueous solution of 3-hydroxypropanal a hydroxide selected from the group claimed in claim 6. The ‘378 and ‘379 patent disclose alkali

metal compounds or ions present in the reaction mixture as promoters, but they do not disclose adding alkali metal compounds to 3-hydroxypropanal after the reaction.

Claims 1-10 were rejected under U.S.C. §103(a) as being unpatentable over Murphy et al. (US 4,873,378) and Murphy et al. (US 4,873,379). Applicants respectfully traverse this rejection based on the claims as currently amended. The MPEP § 2143 states:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

There is no suggestion or motivation to modify either of the two references cited by the examiner. The '378 and '379 patents teach a one-step process employing a rhodium catalyst to convert an epoxide to a 1,3-glycol. The nature of the one-step process provides different products from a two-step process where the 3-hydroxypropanal is not hydrogenated in situ as in the one-step process. The one-step process does not include a catalyst removal step or a neutralization step as the 3-hydroxypropanal is formed and immediately hydrogenated to form a 1,3-glycol to prevent the formation of byproducts. It would not have been obvious to apply any of the teachings of the '378 or '379 patents to reduce the viscosity of a reactive heavy component stream that is present when 1,3-propanediol is produced by a two-step process.

The '378 patent does not teach the use of a hydroxide selected from the group consisting of ammonium hydroxide, alkali metal hydroxides other than sodium hydroxide, and alkaline earth metal hydroxides to neutralize acid present in the reaction mixture. The '378 patent teaches the use of promoters that comprise anions such as Cl⁻, Br⁻, I⁻, and NO₃⁻ which are not typically basic when present with alkali metal cations. These non-basic compounds would not neutralize an acid present in the reaction mixture.

The Examiner cites the '378 patent that "the presence of acid, while not causing the reaction to fail, appears to be somewhat deleterious to both the rate of formation and the yield of 1,3-glycol." That statement is only applicable to "those instances wherein the molar ratio of phosphine to rhodium is less than 1." ('378 patent; col. 6, lines 6-12). There are other instances where "it has been found to be desirable to add a protonic acid to the reaction mixture" preferably "medium or strong acids." ('378 patent; col. 5, lines 44-49). The '378 patent does not teach the neutralizing of an acid present in the reaction mixture, and a person of ordinary skill in the art would not have taken these teachings to mean that acid in the reaction mixture should be neutralized.


The alkali metal cations are used to promote the reaction ('379 patent; col. 5, lines 20-28). The '379 patent teaches the possibility of having an alkali metal hydroxide which is typically basic present in the reaction mixture. However, the '379 patent teaches that the concentration of the promoter is not important and can vary greatly. It would not have been obvious from these teachings to add a hydroxide of an alkali metal in a specific amount to neutralize acid present so that the pH is at least 5.

Even if the prior art references were modified, neither would teach nor suggest all the claim limitations. The '378 and '379 patents as mentioned do not teach a catalyst removal step or an acid neutralization step. The '378 and '379 patents do not teach the use of a reaction mixture at a pH of at least about 5.

The Examiner has failed to meet her burden to establish a prima facie case of obviousness. In light of the above, Applicants respectfully request allowance of the pending claims of the application.

Respectfully submitted,
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